Issue Statement for Division Management Team Meetings
December 2004

Issue: Criteria and Indicators Selected for the Northern Lower Peninsula Ecoteam Planning Processes

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INFORMATION Item
Time Frame: 15 minutes
No decision, but your input is welcome.

Background: An ecosystem-based approach to natural resources management combines ecological, social and economic considerations toward achieving the goal of sustaining Michigan's natural resources. Ecosystem-based management will rely on the following key principles:

- **Partnerships and Citizen Participation:** Work together with citizens, landowners, businesses, local governments, interested organizations, and other agencies to address issues, identify opportunities and find common solutions.
- **Science-Based Approaches:** Use the best available scientific knowledge (ecological, social, and economic) as a foundation for decision-making; understanding natural resource relationships, and focuses on sustainability of ecological systems.
- **Long-term View:** Establish targets and long-term goals for desired ecosystem conditions that maintain the capacity of the land to sustain public benefits and opportunities into the future.
- **Comprehensive Perspective:** Find solutions that support economic prosperity, lasting livelihoods, and ecological health and sustainability.

Each of the ecoteams is developing planning processes to facilitate development of common goals for functional ecosystems that cross multiple ownerships. ***Planning processes integrate ecological, social, and economic values into practical management guidelines.*** Through the planning process we aim to develop common goals and values at various geological scales (e.g., watersheds, landscapes, and Eco-regions). The plan creates an Eco-region level vision for natural resource management, such as for the Northern Lower Peninsula.

This comprehensive strategy is aimed at protecting and enhancing sustainability, diversity and productivity of our natural resources. The Ecological Society of America described eight elements of ecosystem management that are being employed by the DNR for managing Michigan's natural resources including:

- Sustainability: Ecosystem management does not focus primarily on deliverables but rather regards intergenerational sustainability as a precondition.
- Goals: Ecosystem management establishes measurable goals that specify future processes and outcomes necessary for sustainability.
- Sound Ecological Models and Understanding: Ecosystem management relies on research performed at all levels of ecological organization.
- Complexity and Connectedness: Ecosystem management recognizes that biological diversity and structural complexity strengthen ecosystems against disturbance and supply the genetic resources necessary to adapt to long-term change.

- The Dynamic Character of Ecosystems: Recognizing that change and evolution are inherent in ecosystem sustainability, ecosystem management avoids attempts to freeze ecosystems in a particular state of configuration.
- Context and Scale: Ecosystem processes operate over a wide range of spatial and temporal scales, and their behavior at any given location is greatly affected by surrounding systems. Thus, there is no single appropriate scale or timeframe for management.
- Humans as Ecosystem Components: Ecosystem management values the active role of humans in achieving sustainable management goals.
- Adaptability and Accountability: Ecosystem management acknowledges that current knowledge and paradigms of ecosystem functions are provisional, incomplete, and subject to change. Management approaches must be viewed as hypotheses to be tested by research and monitoring programs.

How the resource "appears" from a broad range of measurement standards indicate its health and vitality. We need to examine key issues and the ways in which to measure health of the resource. The ecoteams are incorporating international, national, and regional efforts to identify ***criteria*** that define sustainable resources and ***indicators*** that measure progress toward sustainable management. Each ecoteam may have a core of the same criteria and indicators, but because of the uniqueness of the ecoregion, they may have a few additional or different indicators.

Criteria provide a sense of the relative importance society places on resource values and uses. Criteria capture a wide range of values that include ecological, social, and economic. Typically these include: conservation of biological diversity, spiritual values, ecosystem condition and productivity, recreation, conservation of water and soil resources, ownership patterns, ecological cycles, economic health, unique natural features, institutional processes, and social / cultural values.

Under each criterion there are multiple indicators. Indicators help DNR resource managers evaluate resource management plans and policies and/or assess the impact of these plans and policies on the environment. The indicators are unique and specific to each criterion and each are measurable, predictable, and feasible.

At this time, the NLP Ecoteam has developed a set of criteria and indicators that we believe will capture the health of the Northern Lower Peninsula and provide a baseline for planning processes. These C&I are being presented to each management team for information and review prior to moving them out to a public review process. The public review process will take place through public meetings as well as the website that we have developed. Short television promotions will also be shown to let people know that they can provide input to this process.

Once the C&I are agreed upon, the next phase will be to develop target levels for each of the indicators and cast the ecoregion with a report card of its health. At this time, our very, very, very valuable SIRC staffer (Matt Tonello) is working to conduct a gap analysis of available data to identify where we currently have data and where we will need to seek additional information either through targeted research or monitoring.

Your thoughts and comments are welcome as we finalize the draft and prepare for public review. Please submit comments to Tom Haxby (haxbyt@michigan.gov) or Tammy Newcomb (newcombt@michigan.gov) by January 31, 2005.

CRITERIA	INDICATORS	METRICS
1. Conservation of Biological Diversity	1.1 Landscape and Ecosystem Diversity	1.1.1 Percent and extent of vegetation types relative to historical conditions (at varying scales) 1.1.2 Richness and evenness of ecosystems or vegetation types (by age class for forested systems) 1.1.3 Richness and evenness of glacial landforms or soil types and index of topographic heterogeneity 1.1.4 Percentage, area and representatives of vegetation types in designated protected areas of natural and scientific interest 1.1.5 Level of fragmentation, connectivity, shape, size and spatial distribution of vegetation types 1.1.6 Connectivity of glacial landforms and/or soil types 1.1.7 Number, area and distribution of unusual or rare vegetation types
	1.2 Species Population Diversity	1.2.1 Absolute and relative abundance of habitat types and their importance for special interest species 1.2.2 Distribution, dispersion and population trends of special interest species 1.2.3 Changes in habitat of special interest species 1.2.4 Species classified as threatened, endangered, rare or vulnerable and their population sizes and habitat condition 1.2.5 Number of known species that occupy a smaller portion of their former range and the number of known species that occupy a larger portion of their former range 1.2.6 Species richness of all plants, animals and fungi within representative ecosystems
	1.3 Genetic Diversity	1.3.1 Proportion of forest area as plantations using native vs. non-native genotypes 1.3.2 Proportion of water bodies using native vs. non-native fish stock genotypes 1.3.3 Proportion of water bodies with sustainable fisheries produced by stocked vs. natural reproduction 1.3.4 Planted openings on managed lands with native vs. non-native species

2. Ecosystem Condition and Productivity	2.1 Incidence of Disturbance and Stress	2.1.1 Area and severity of forest stressor 2.1.2 Area and severity of wind and fire activity 2.1.3 Presence, extent and number of invasive exotic species 2.1.4 Area and severity of mammalian herbivory 2.1.5 Area and intensity of timber harvest 2.1.6 Land clearing/urban sprawl 2.1.7 Percentage of impervious surface 2.1.8 Distribution of active and non-restored oil and gas sites per township 2.1.9 Number of miles of oil and gas pipelines per township 2.1.10 Amount of ownership fragmentation and parcelization of lands 2.1.11 Miles of utility corridors, numbers of communication structures
	2.2 Ecosystem Resilience	2.2.1 Area by vegetation type and age class 2.2.2 Area successfully regenerated by vegetation type 2.2.3 Ecological function, activity and responses to perturbation within "protected areas" 2.2.4 Distribution and abundance of top carnivores 2.2.5 Distribution and abundance of mammalian herbivores 2.2.6 Ratio of exotic invasive plant species to native plant species in natural vegetative communities 2.2.7 Presence of spring ephemerals
	2.3 Biomass	2.3.1 Mean annual increment by forest type and age class 2.3.2 Net annual growth by forest type and age class for the NLP 2.3.3 Biomass volumes of standing flora

	2.4 Ecosystem Structure Forested Ecosystems (1 – 8) Non-Forested Ecosystems (9 & 10) Aquatic Ecosystems (11 – 16)	2.4.1 Number of super canopy trees 2.4.2 Snags per area, basal area, mean DBH and decay class 2.4.3 Cavities per area by size class 2.4.4 Coarse woody debris per area, mean DBH and decay class 2.4.5 Number of vertical vegetation layers per area 2.4.6 Number and size of tree-fall gaps, harvest gaps and maintained wildlife openings per area in Northern hardwood ecosystems 2.4.7 Tree size: basal area per acre/hectare for different forested communities 2.4.8 Distribution of cliffs, outcrops, sinks and glacial erratics 2.4.9 Number of vertical vegetation layers per area 2.4.10 Ratio of open water to emergent vegetation in wetlands 2.4.11 Surface and sub-surface geology of valley segment 2.4.12 Number of vertical vegetation layers by valley segment 2.4.13 Surface and sub-surface hydrology of valley segment 2.4.14 Coarse woody debris per area, mean DBH and decay class 2.4.15 Bathometric shape of lakes 2.4.16 Aquatic plant abundance and distribution

3. Water and Soil Conservation	3.1 Water Quality Surface Water (1 – 10) Ground Water (11 – 15)	3.1.1 Percent of rural/urban land managed for water conservation (watershed quality) 3.1.2 Water chemistry (pH, dissolved O^2, water conductivity, turbidity and water temperatures) and volume flow 3.1.3 Fecal coliform 3.1.4 Nutrients (nitrates and phosphates) 3.1.5 Fish species diversity 3.1.6 Benthic species diversity 3.1.7 Number of water crossings per unit area 3.1.8 Pesticide residue concentrations in surface water 3.1.9 Area of wetlands 3.1.10 Surface withdrawals by volume 3.1.11 Ground water recharge zones 3.1.12 Ground water elevations 3.1.13 Quality of drinking water 3.1.14 Total water wells abandoned due to man-made contaminants 3.1.15 Sub-surface withdrawals by volume
	3.2 Soil Conservation	3.2.1 Area of lands managed for soil conservation (reflects the fragility of the soil on some sites) 3.2.2 Soil stability and productivity (pH, soil faunal and fungal activity, soil erosion, degradation indices) 3.2.3 Area of vegetated riparian corridors
4. Ecological Cycles	4.1 Carbon Cycle	4.1.1 Area of forest permanently, semi-permanently or temporarily converted to non-forest land use 4.1.2 Carbon pool in forest products 4.1.3 Carbon pools in soils 4.1.4 Amount of fuels consumed 4.1.5 Fuelwood consumption/atmospheric

	4.2 Hydrological Cycle	4.2.1 Number, distribution and acres of impoundments affected by natural and artificial water control structures 4.2.2 Surface area of lakes and wetlands; total flow data for rivers and streams 4.2.3 Changes in Great Lakes water levels 4.2.4 Annual precipitation 4.2.5 Groundwater withdrawals 4.2.6 Great Lakes water withdrawals 4.2.7 Acres of artificially created surface
5. Uncommon or Rare Natural Features	5.1 Uncommon or Rare Vegetation Types	5.1.1 Type, area, distribution and quality of uncommon or rare vegetation types 5.1.2 Type, area, distribution and representativeness of uncommon or rare vegetation types and their protection status (i.e. protected areas, natural areas, old growth, wild and scenic rivers, state parks) 5.1.3 Type, area and distribution of uncommon or rare vegetation types under passive management 5.1.4 Availability of critical fisheries habitat to support natural reproduction 5.1.5 Miles of undeveloped Great Lakes shoreline, inland lakes and water courses
	5.2 Uncommon or Rare Species	5.2.1 Population levels, habitat distribution and changes over time of selected uncommon or rare species (species will need to be selected) 5.2.2 Number of species classified as threatened, endangered, rare or vulnerable relative to the total number of known species by taxa
	5.3 Geophysical and Hydrophysical Features	5.3.1 Number, location and protection status of physical features and landforms (karsts, dunes, rock outcrops, eskers, drumlins, moraines, fossil beds) 5.3.2 Number of unique water features: aquifers, artesian wells, springs, waterfalls, recharge zones

6. Social/Cultural	6.1 Stability of Land Use	6.1.1 Percentage of lands that are under large-scale alterations by vegetative type 6.1.2 Area of lands under restoration by vegetative type 6.1.3 Amount of change of ownership 6.1.4 Amount of ownership fragmentation and parcelization of land 6.1.5 Traditional uses for cultural forest products (e.g. berries, syrup, mushrooms, black ash, cattails, etc.) 6.1.6 Number and size of forested parcels that have been added to or removed from the Commercial Forest Program
	6.2 Place for Nature and Scientific Study	6.2.1 Area and vegetation types in areas of natural and scientific interest 6.2.2 Number of educational opportunities 6.2.3 Presence of natural features, plant species and wildlife species important to the identity of the area
	6.3 Archaeology and History	6.3.1 Archaeological site potential 6.3.2 Presence of a known archaeological site (More weight can be given to sites that are on the National Register of Historic Places. This register includes prehistoric sites as well.) 6.3.3 Presence of an area(s) of historical/cultural significance (Many times these areas may show no signs of their significance, e.g. a Native American Indian trail corridor where the trail is no longer visible, or a spot at which a meeting or discovery took place.) 6.3.4 Presence of spiritual/ceremonial activities
	6.4 Presence of Local Planning Efforts for the Sustainability of Natural Resources and Communities	6.4.1 Percent of townships addressing sustainability of natural resources and communities 6.4.2 Percent of counties addressing sustainability of natural resources and communities 6.4.3 Presence of regional or watershed area planning efforts

7. Spiritual	7.1 Undeveloped Natural Resources	7.1.1 Size and distribution of natural and "special management" areas and allowed use of those areas 7.1.2 Road and motorized trail density 7.1.3 Density and distribution of dwellings and commercial structures 7.1.4 Measure/monitor distribution of undeveloped areas in populated areas
	7.2 Aesthetics	7.2.1 Area and distribution of "secluded" natural resources 7.2.2 Presence of litter or trash dumped on landscape 7.2.3 Number of designated access opportunities to view scenic vistas and/or wildlife 7.2.4 Miles of road by use class, distribution and density in NLP 7.2.5 Visual management 7.2.6 Emotional/intrinsic values (Are my needs being met?)
8. Recreation	8.1 Hunting, Trapping and Fishing	8.1.1 User days per activity 8.1.2 Satisfaction levels 8.1.3 Population health by species 8.1.4 Population density by species 8.1.5 Harvest number by species 8.1.6 Number and distribution of shooting ranges 8.1.7 Amount of Commercial Forest (CF) lands, changes in status 8.1.8 Law Enforcement activity – number of warnings, summons, arrests per activity 8.1.9 Number of safety training opportunities per activity 8.1.10 Accident trends per activity per season 8.1.11 Number of licensed charter boats and river guides 8.1.12 Number of hunting guides 8.1.13 Number of shooting preserves and game ranches

	8.2 Designated Trails – motorized and non-motorized (hiking, ORV, snowmobile, skiing, equestrian)	8.2.1 Infrastructure and resources available for trail maintenance 8.2.2 User days per activity 8.2.3 Miles of trail systems by trail ownership and management type 8.2.4 Trail conditions including stream and wetland crossings complying with BMPs, laws and policies across Federal agency, DNR, local government and club ownership 8.2.5 Number of safety training opportunities per activities 8.2.6 Accident trends per activity per season 8.2.7 Satisfaction levels of trail users 8.2.8 Miles of trails by type of use
	8.3 Nature Appreciation and Education	8.3.1 Area of NLP by vegetation type, age class and ownership 8.3.2 Miles of public Great Lakes shoreline, inland lakes and water courses 8.3.3 Percentage, area and representativeness of vegetative types in areas of natural and scientific interest 8.3.4 User days per activity for non-consumptive uses 8.3.5 Number of unique species observation opportunities 8.3.6 Eco-tour opportunities
	8.4 Special Scenic Sites	8.4.1 Size and distribution of natural and "special" areas and their allowed use 8.4.2 Miles of designated scenic routes 8.4.3 Number of designated viewing areas
	8.5 Camping – Includes Dispersed and Designated Sites	8.5.1 Number, type and distribution of campground facilities – rustic, modern, semi-modern, cabin rentals 8.5.2 Number of campsites by type in public and private campgrounds 8.5.3 User days by campground and campsite 8.5.4 Number of dispersed camps per year 8.5.5 Environmental impact of camping Benchmarks: soil erosion from human use, trash presence, carrying capacity of facility vs. overuse

	8.6 Water Recreation – Motorized and Non-motorized (including swimming, scuba diving, kayaking, etc.)	8.6.1 User days per activity (power/sail boating, jet-skis, canoes, rafting/tubing, kayaking, swimming, snorkeling, fishing, water skiing, boat races, cruise ships, sail boarding, etc.) 8.6.2 Number of water access sites and boat slips by type and capacity for watercraft and available amenities 8.6.3 Change in status of water body designation and use 8.6.4 Number of safety training opportunities per activity 8.6.5 Accident trends per activity per season 8.6.6 Satisfaction levels of water recreation users
	8.7 Diversity of Recreational Opportunities: the availability of different ways for people to recreate on the landscape	8.7.1 Availability of recreational activities by type, i.e. lakes, rivers, forest, parks 8.7.2 Universal (barrier free) access to facilities 8.7.3 Quality and satisfaction of recreational experience (Would LED activity indicate quality?) 8.7.4 Seasonally adjusted number of participants
9. Ownership Patterns	9.1 Ownership Types (the distribution and area of land by owner)	9.1.1 Percent of public and private ownership in the NLP 9.1.2 Changes in ownership by acres 9.1.3 Distribution of ownership in the NLP by acres
	9.2 Stewardship	9.2.1 Number, acres and distribution of private land management plans and percent of private ownership with management plans 9.2.2 Miles of Great Lakes shoreline, inland lakes and water courses under special management 9.2.3 Number and location of conservation easements in the NLP 9.2.4 Number of cooperative planning “agreements” across ownerships in the NLP 9.2.5 Land use patterns across all ownerships 9.2.6 Percentage of forested lands certified by ownership

	9.3 Accessibility to Public Land	9.3.1 Percent of public and private land in the NLP 9.3.2 Number and location of access easements across public lands 9.3.3 Number and location of access easements across private lands 9.3.4 Number of acres of public land without access (landlocked by private ownerships) 9.3.5 Number of acres of private land enrolled in the Commercial Forest Program 9.3.6 Existence of a road maintenance plan and expenditures by agency 9.3.7 Miles of road by use class, distribution and density in the NLP
10. Economic Health	10.1 Local and Community Economic Health Trends	10.1.1 Number of local economic development plans in the NLP Eco-Region 10.1.2 Describe job/income/employment/retirement data 10.1.3 Contribution of the resource use to gross domestic product (GDP) of all sectors of the economy 10.1.4 Diversity of forest economic activity 10.1.5 Measure change in the tax base 10.1.6 Capital outlay and investment trends
	10.2 Non-Timber Economic Benefits	10.2.1 Number of jobs/economic activity (e.g. indirect service jobs, recreation/tourism and recreation equipment) 10.2.2 User days per activity 10.2.3 Motel occupancy rates 10.2.4 Mean and median travel spending per person per day per activity 10.2.5 Total expenditures by individuals per activity in the NLP
	10.3 Timber and Wood Products	10.3.1 Timber volume, growth and mortality 10.3.2 Timber harvest by species 10.3.3 Legal and physical accessibility; limit on timber availability for reason of policy, legality, management decisions and physical access 10.3.4 Wood product summary 10.3.5 Determine ratio of harvest to growth by volume, species and products 10.3.6 Net difference between growth and harvest by species 10.3.7 Number of jobs/economic activity (e.g. logging, hauling and mills) 10.3.8 Wood budget – how much wood going out of the area

11. Institutional Processes	11.1 Legal Framework for Ecosystem Management	11.1.1 Land management laws and regulations 11.1.2 Wildlife management laws and regulations 11.1.3 Recreation laws and regulations 11.1.4 Fisheries management laws and regulations 11.1.5 Native American treaty rights 11.1.6 Department and Division policies and procedures 11.1.7 Compliance with land management laws, regulations, policies and guidelines (LRPGs)
	11.2 Institutional Framework	11.2.1 Public participation in the decision-making processes 11.2.2 Public participation in decision-making processes 11.2.3 Public participation in implementation of decisions and monitoring
	11.3 Balance Between Different Values	11.3.1 Amount of management effort/interest put into different values 11.3.2 Annual evaluation and reporting of the eco-system management effort in maintaining the values on the landscape and appropriate adjustments made 11.3.3 Application and effectiveness of dispute resolution guidelines/policy
	11.4 Resources Allocated for Ecosystem Management Values	11.4.1 Resources allocated within the Department for ecosystem management planning, implementation and monitoring 11.4.2 Participation in external planning efforts (e.g. National Forest plan revisions) 11.4.3 Expenditure of resources and dedicated funds for “on-the-ground” projects